Plasma Processes, Inc.

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Innovative W Alloys for Advanced Propulsion Systems

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Description and Objectives

•Increase ductility and strength of tungsten using innovative W-Re-HfC alloy

• Reduce cost and fabrication time for propulsion components using net shape VPS processes

Material	UTS, MPa 1000°C	UTS, MPa 2000°C
Pure W	240	45
W-4Re	360	80
W-4Re-HfC	720	200

•Non-Eroding W-Re-HfC throats will be hot fire tested at ATK-Thiokol at no charge to Phase I/II.

•Advanced high powered propulsion components to be fabricated and hot fire tested in Phase II.

Approach

•Develop mechanically alloyed and plasma spheroidized W-Re-HfC powder

•Materials characterization

• Hot fire test VPS W-Re-HfC solid rocket nozzle liners to demonstrate no erosion

ATK ALLIANT TECHSYSTEMS

Schedule and Deliverables

•24 month program

•Metallurgy, tensile, creep, and properties data

• Hot fire test data for W-Re-HfC nozzle liners

NASA & Commercial Applications

•High powered electrical, nuclear, beamed energy propulsion components. microgravity crucibles

•Tactical and ballistic nozzles, $300K Phase III